What is claimed is:

1. A method of producing a mesoporous alumina molecular sieve, comprising:

mixing a surfactant and an alumina precursor with an organic solvent to produce a mixture;

adding water to the mixture;

hydrothermal synthesizing the mixture with added water; and

drying and calcinating the mixture to remove residual surfactants.

2. The method as claimed in claim 1, wherein the alumina precursor to water in mole ratio is 1: 0.1 to 10.

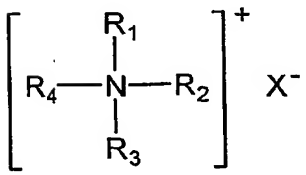
3. The method as claimed in claim 2, wherein the alumina precursor to water in mole ratio is 1 : 1 to 3.

4. The method as claimed in claim 1, wherein the surfactant to water in mole ratio is 1 : 0.1 to 10.

5. The method as claimed in claim 1, wherein the surfactant is a cationic surfactant.

6. The method as claimed in claim 5, where in the cationic surfactant is represented by chemical formula 1 below:

[Chemical Formula 1]



wherein R_1 to R_3 represent substituted or unsubstituted alkyl group with 1 to 4 carbon atoms, R_4 represents substituted or unsubstituted alkyl group with 8 to 22 carbon atoms, and x represents a halogen atom, acetate, phosphate, nitrate, or methylsulfate.

7. The method as claimed in claim 1, wherein the alumina precursor is an aluminum alkoxide.

8. The method as claimed in claim 7, wherein the aluminum alkoxide is an aluminum-tri-butoxide or an aluminum isopropoxide.

9. The method as claimed in claim 1, wherein the organic solvent is an alcoholic-based solvent.

10. The method as claimed in claim 9, wherein the organic solvent is 1-butanol, 2-butanol, 1-propanol or 2-propanol.

11. The method as claimed in claim 1, wherein the hydrothermal reaction is carried out at 0 to 200°C for 10 to 100 hours.

12. A mesoporous alumina molecular sieve produced by using any of the method as claimed in any one of claims 1 through 11.

13. A method of producing alumina nanotube, comprising:

mixing a surfactant and an alumina precursor to produce a mixture;

adding water to the mixture;

hydrothermal synthesizing the mixture with added water; and

drying and calcinating the mixture to remove residual surfactants.

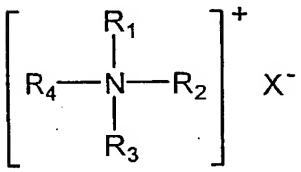
14. The method as claimed in claim 13, wherein the alumina precursor to water in mole ratio is 1: 0.1 to 10.

15. The method as claimed in claim 14, wherein the alumina precursor to water in mole ratio is 1 : 1 to 3.

16. The method as claimed in claim 13, wherein the surfactant to water in mole ratio is 1 : 0.1 to 10.

17. The method as claimed in claim 13, wherein the surfactant is a cationic surfactant of chemical formula 1 below, an anionic surfactant of chemical formula 2 below, a nonionic surfactant of chemical formula 3 below, or a neutral surfactant of chemical formula 4 below.

[Chemical Formula 1]



wherein R_1 to R_3 represent substituted or unsubstituted alkyl group with 1 to 4 carbon atoms, R_4 represents substituted or unsubstituted alkyl group with 8 to 22 carbon atoms, and x represents a halogen atom, acetate, phosphate, nitrate, or methylsulfate.

[Chemical Formula 2]

R_5-COOH

wherein R_5 represents substituted or unsubstituted alkyl group with 1 to 22 carbon atoms.

[Chemical Formula 3]

$$CH_3(CH_2)_{30}(CH_2CH_2O)_n\text{-}OH$$

wherein n represents an integer of 1 to 30.

[Chemical Formula 4]

$$R_6\text{-}NH_2$$

wherein R_6 represents substituted or unsubstituted alkyl group with 8 to 22 carbon atoms.

18. The method as claimed in claim 13, wherein the alcoholic group of organic solvents is 1-butanol, 2-butanol, 1-propanol or 2-propanol.

19. The method as claimed in claim 13, wherein the hydrothermal reaction is carried out at 0 to 200°C for 10 to 100 hours.

20. A method of producing alumina nanotube, comprising:
mixing a surfactant and an alumina precursor with an organic solvent to produce a mixture;
adding water to the mixture;
hydrothermal synthesizing the mixture with added water; and
drying and calcinating the mixture to remove residual surfactants and further comprising adding a lithium precursor during producing the mixture or after the calcinating process.

21. The method as claimed in claim 20, wherein the lithium precursor and water is added after the calcinating process and further drying and

calcinating to produce an alumina nanotube with lithium, and again adding the lithium precursor by impregnation method followed by calcinating process.

22. The method as claimed in claim 20, wherein the lithium precursor is a lithium hydroxide, halide, nitrate, carbonate or sulfate.

23. The method as claimed in claim 20, wherein the alumina precursor to the lithium precursor mole fraction is 1 : 0.1 to 10.

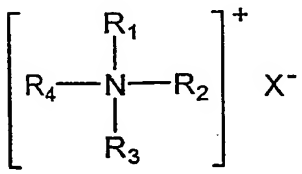
24. The method as claimed in claim 20, wherein the alumina precursor to mole fraction is 1 : 0.1 to 10.

25. The method as claimed in claim 20, wherein the alumina precursor to water mole ratio is 1 : 1 to 3.

26. The method as claimed in claim 20, wherein the surfactant to water mole ratio is 1 : 0.1 to 10.

27. The method as claimed in claim 20, wherein the surfactant is a cationic surfactant of chemical formula 1 below, an anionic surfactant of chemical formula 2 below, a nonionic surfactant of chemical formula 3 below, or a neutral surfactant of chemical formula 4 below;

[Chemical Formula 1]



wherein R_1 to R_3 represent substituted or unsubstituted alkyl group with 1 to 4 carbon atoms, R_4 represents substituted or unsubstituted alkyl group with 8 to 22 carbon atoms, and x represents a halogen atom, acetate, phosphate, nitrate, or methylsulfate.

[Chemical Formula 2]

R_5-COOH

wherein R_5 represents substituted or unsubstituted alkyl group with 1 to 22 carbon atoms.

[Chemical Formula 3]

$CH_3(CH_2)_{30}(CH_2CH_2O)_n$-OH

wherein n represents an integer of 1 to 30.

[Chemical Formula 4]

R_6-NH_2

wherein R_6 represents substituted or unsubstituted alkyl group with 8 to 22 carbon atoms.

28. The method as claimed in claim 20, wherein the aluminum precursor is a aluminum alkoxide.

29. The method as claimed in claim 20, wherein the hydrothermal reaction is carried out at 0 to 200°C for 10 to 100 hours.

30. An alumina nanotube produced by any of the method of claims 13 through 29.

31. A hydrogen storage material produced by inducing absorption of hydrogen to the aluminum nanotube of claim 30.

32. A hydrogen storage material of claim 32, wherein the absorption of hydrogen is carried out while maintaining temperature of a container holding the nanotube at 298K to 673K and maintaining the pressure of hydrogen gas at 1 to 10 atmospheric pressure.

33. The hydrogen storage material of claim 32, wherein the container holding the nanotube is vacuum treated at 373K to 773K prior to inducing hydrogen adsorption.